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ABSTRACT

A mobile unit was used over a 2 1/2 month period to demonstrate that a mobile tutoring program for eight infants with Down's Syndrome (12 to 18 months old) had certain educational, economic, and logistical advantages. The vehicle and camper body were said to have been chosen according to the following criteria: sufficient height to permit an adult to stand without stooping, basic housekeeping and child care accommodations, a working area large enough to accommodate one child and one adult, and adequate lighting, heating and cooling apparatus. The program employed two undergraduate women selected because of their ability to relate to young children effectively, careful driving habits, excellent language skills, and willingness to help create and carefully implement lesson plans. The curriculum emphasized planned language stimulation through gamelike activities such as finger plays, music, art, tea parties, sandbox activities and water play. It was reported that seven of the eight children adapted readily to the new learning environment and that the cost of providing itinerant teaching services (3 hours per child per week) compared favorably with the usual cost of providing a public school teacher for homebound children. (GW)

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A MOBILE UNIT FOR DELIVERING EDUCATIONAL SERVICES TO DOWN'S SYNDROME (MONGOLOID) INFANTS

John E. Rynders and J. Margaret Horrobin
University of Minnesota
Research, Development and Demonstration
Center in Education of Handicapped Children
Minneapolis, Minnesota

January 1972

Department of Health, Education and Welfare
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A MOBILE UNIT FOR DELIVERING EDUCATIONAL SERVICES TO DOWN'S SYNDROME (MONGOLOID) INFANTS

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University of Minnesota

Research, Development and Demonstration
Center in Education of Handicapped Children
University of Minnesota
Minneapolis, Minnesota

January 1972

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Department of Health, Education and Welfare
U. S. Office of Education
Bureau of Education for the Handicapped

RESEARCH AND DEVELOPMENT CENTER
IN EDUCATION OF HANDICAPPED CHILDREN
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The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

A Mobile Unit for Delivering Educational Services to Down's Syndrome (Mongoloid) Infants

John E. Rynders
J. Margaret Horrobin
University of Minnesota

One out of every six or seven hundred children born in the United States suffers from a chromosomal anomaly known as Down's Syndrome (Mongolism). About six or seven thousand children with the condition are born in this country each year (Kramm, 1967). Because the IQ's of Down's children tend to decrease as a function of increasing chronological age (Dameron, 1963; Carr, 1970), most have IQ scores which fall in the severe (IQ 20-35) or moderate range (IQ 36-51) of intelligence (Robinson & Robinson, 1965) at maturity. While those who are reared at home tend to have higher IQ scores than those reared in an institution (Centerwall & Centerwall, 1960; Durling and Benda, 1952; Stedman and Eichorn, 1964; Shipe and Shotwell, 1965), parents wishing to keep their Down's Child at home have not generally found much in the way of community services to encourage their efforts. Nevertheless, evidence of the positive effects of home rearing has given parents some hope and has increased their desire to keep their Down's child at home during his early years. This desire, translated into powerful lobbying efforts, has done much to stimulate the development of community services for educating and caring for Down's children. But despite the creation of these community services and some evidence that an educational stimulation program can enhance the Down's child's development (Coriat, Theslenco, Waksmann, 1967;

Buddenhagen, 1971; Matkin & Molloy, 1970; Rhodes, Gooch & Siegelman, 1970) virtually no formal educational services are available to these children prior to the time they're eligible for a day activity center program (usually not before the age of three). To make matters worse, a day activity center program if available may be virtually inaccessable to families in rural areas because of the problems involved in assembling young low incidence children who live great distances apart.

The two major purposes of the mobile unit demonstration project were to show that (1) early education services can be carried effectively to the very young retarded child without upsetting him or disrupting the routine of his family, and (2) that the use of a vehicle for early education purposes is both logistically and economically feasible.

Before describing the project, let us take a look briefly at the educational uses vehicles have been put to in recent years.

Uses of Vehicles for Educational Purposes

In a mobile society such as ours one might expect that motor vehicles would serve a wide variety of educational purposes. This expectancy is fully justified. Vehicles are used for such diverse educational activity as for example:

In Russell County, Kentucky, a school district uses a mobile unit, funded by ESEA, Title I as a medical clinic. The clinic travels throughout the district providing medical and dental examinations for 2,600 school children. Heated and air conditioned, the vehicle contains an examination table, equipment cabinets, dental chair, refrigerator, equipment for testing vision and hearing, weight scales, sinks, desk,

and even an intercommunication system (American School and University, 1969).

On the roads of North Central Florida, a mobile museum reproduces the atmosphere and the artifacts of Florida's history. The traveling museum--created by the Florida State Museum, a department of the University of Florida, in cooperation with St. John's County -- is contained in a 12 foot by 45 foot semitrailer unit. Reportedly, school children are apt to forget that they are in the 20th century as they stand in the simulated captain's quarters on an early sailing ship, listening to the sound of creaking rigging, running feet and muffled Spanish commands. Looking about, they see a lantern casting its light on nautical instruments and an explorer's armor. "Water" reflects off white-washed beams as, through the window, a Florida seascape rocks with the pitching and rolling of the ship. The air smells of seaweed and salt brine. The effect must achieve a high degree of realism since children often dub it the "seasick machine." (American School and University, 1969).

With respect to filling the more ordinary educational needs of children, vehicles are in use as traveling classrooms (Peters, 1970; Carlevatti, 1969) for providing remedial reading instruction (Grade Teacher, 1966; Valitchka, 1967) and as mobile speech and hearing therapy units (Hennessy, 1969).

To our knowledge, no one has attempted to educationally stimulate normal or retarded infants from a mobile unit. But, in at least one instance, a mobile unit has been used as a preschool (Lipson, 1969). Utilizing a Ford Econoline Supervan, Lipson remodeled the vehicle to

transport sufficient instructional material for 15 preschool children. Driven to a park each morning, the unit was easily and quickly set up for instruction, and was readied for travel again at the end of the morning--taking about 15 minutes to return equipment to special spaces provided in the vehicle.

The Mobile Unit for Down's Syndrome Infants

In 1969 the Department of Special Education at the University of Minnesota received support from the U. S. Office of Education, Bureau for Education of the Handicapped, to establish a Research and Development Center. At that time the authors received support to study the communication skill development of Down's Syndrome children on a longitudinal basis.

During the summer of 1970, we set out to assess the feasibility of using a vehicle instead of a child's home as a tutoring site, and a teacher other than a child's own mother to tutor. We were hopeful that a mobile unit might prove to be a useful alternative to transporting infants long distances to a group setting--a procedure that can wear children down both physically and emotionally. Also hoped for was an alternative to sending an itinerant teacher into a child's home on a frequent basis, a procedure that sometimes proves awkward for both mother and teacher. We were particularly interested in using the mobile unit during the time the children were around a year of age -- the age at which children are supposed to experience fright when separated from their mothers (Bowlby, 1951).

Specifications of Vehicle and Camper Body. The vehicle selected was a 1970, 3/4 ton, International pickup truck. Many different brands of trucks will handle camper bodies nicely. It is imperative, however, that the truck be large enough to accomodate the camper body without jeopardizing the trucks stability, braking power or unduly reducing its acceleration capabilities. Many trucks now on the market are specially equipped to accommodate camper bodies; we recommend these. We especially recommend that the vehicle be equipped with power assist features such as power steering and power brakes and that it have an automatic transmission. In a word, the optimal truck is one that handles a camper body with maximum safety, ease and comfort.

As was the case in selecting a truck, there are many brands of camper bodies which will work satisfactorily for the purpose of one-to-one educational stimulation. Some of the major criteria used in selecting a camper body were as follows:

1. Sufficient height inside to permit an adult to stand without stooping. It is not reasonable to expect an adult to spend several hours with a young child in a vehicle unless the adult can stand and stretch and move about comfortably.
2. Basic housekeeping and child care accomodations, e.g., kitchen and bathroom facilities, to permit the unit to operate independent of a child's home.
3. Working area that will comfortably accommodate an adult and one child as they work together with various instructional materials.

4. Adequate lighting that will operate efficiently from the truck's battery for at least two hours without the necessity of operating either the truck engine or any other gasoline engine that might be a health hazard because of fumes. (Gasoline engines also produce undesirable noise while tutoring is going on).

5. Adequate heating and cooling capabilities to permit comfortable operation (in Minnesota temperatures range from +100° to -35° farenheit). Most camper bodies in Minnesota are adequately insulated and have propane gas operated heating plants which will keep the unit warm even on a bitterly cold day. Air conditioning is a problem, however. Since we did not want to have a gasoline engine operating when we were parked in front of the child's home, we could not operate an air conditioner with that type of power source. This problem was solved by having an opening cut in the side of the camper body and fastening the air conditioner in place as one would do in installing an air conditioner through a wall in a home. When parked it was an easy matter to unroll an extension cord from the air conditioner and plug it into a 110 Volt convenience outlet in the child's home.

The camper body we selected was a Winnebago, Model 108 SD Indian (figure 1).[1] We chose this model because of the criteria just cited but particularly because of the excellent inside area it provided for one-to-one instructional interaction. In this model the table can be

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[1]Drawing of Winnebago, Model 108 SD Indian courtesy of Winnebago Industries, Inc. Photos of the interior of the camper were taken by Mr. Warner Clapp, University of Minnesota Photography Laboratory, and Mr. David Wangsness, Research Assistant.

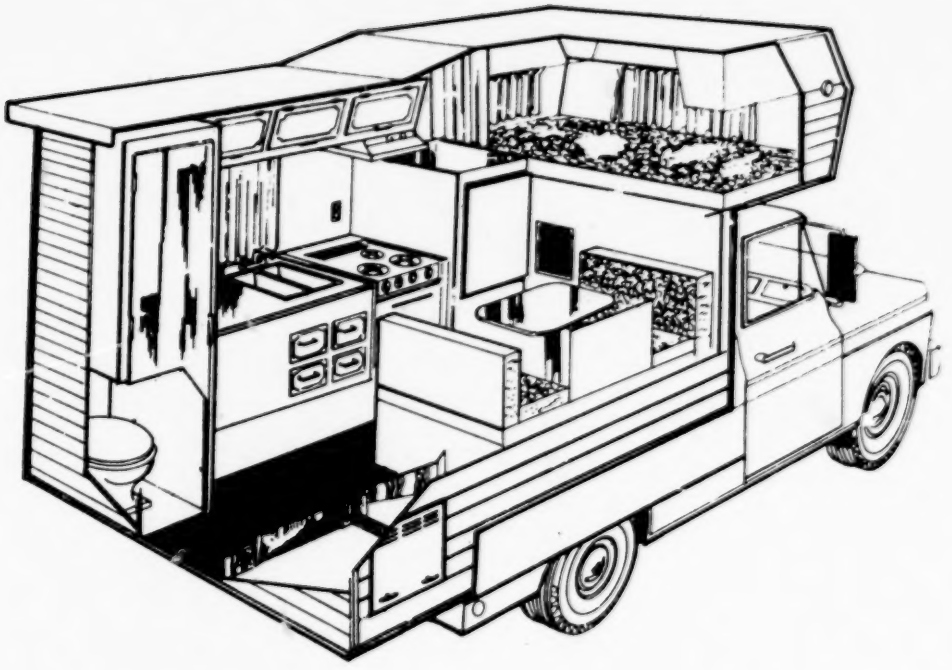

Fig. 1

unfastened from the floor and dropped down to rest on the top of the front edges of the two seats on either side of the table creating a 40" by 75" area that is the same height as the seats and when covered with the seat-back cushions creates an excellent working space for an adult and one child (figures 2, 3, 4 and 5).

The vehicle with camper body, was leased through National Car Rentals.

Staff and Curriculum for the Mobile Unit.[2] Infant teachers[3] were two undergraduate women at the University of Minnesota who had considerable child care experience but no formal training in working with young children. They were selected because of their ability to relate to young children effectively, careful driving habits, excellent language skills and their willingness to help create and then carefully implement lesson plans. (See Appendix for a sample lesson plan)

The curriculum that the teachers followed was designed to augment the experimental one that was being used by the mothers each day. The emphasis was on planned language stimulation (receptive and expressive) through gamelike activities such as the following:

1) Finger-plays - Developed imitative ability and fine motor coordination. Emphasis was placed on counting, singing and story telling.

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[2]Overall curriculum planning and coordination for this project was done by Mrs. Nancy Jones. The author wishes to acknowledge her excellent contribution to this effort.

[3]The author wishes to thank the two teachers of infants, Miss Helen Billing, and Mrs. Laurie Larsen, for their excellent services. Thanks also to Miss Billing for her help in the preparation of this paper.

Fig. 2

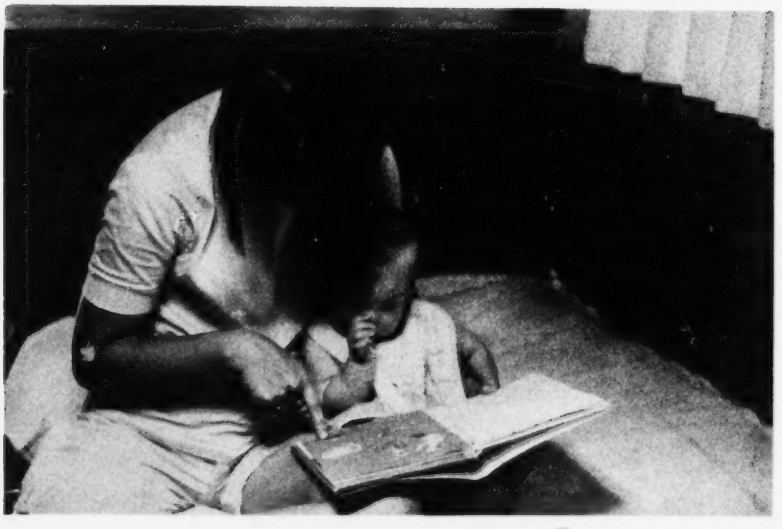

Fig. 3

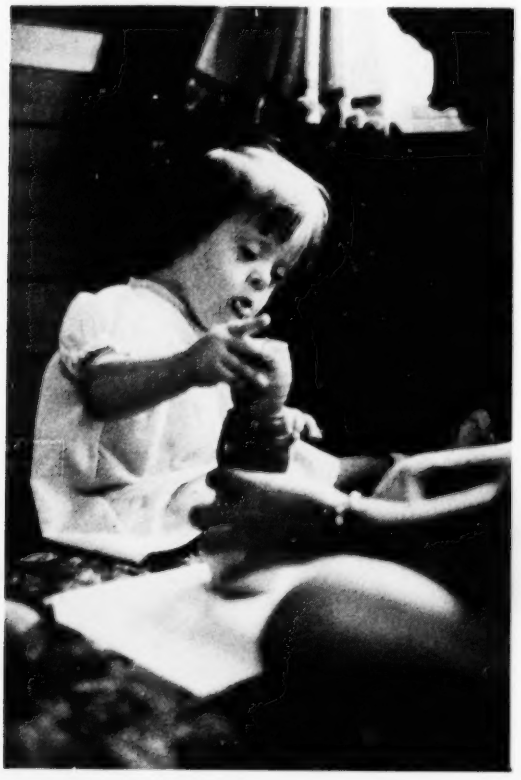

Fig. 4

Fig. 5

2) Music - The use of a record player and musical instruments provided opportunities for the development of imitative responses, motor coordination, social interaction.

3) Dressing and undressing - A useful self-care skill. The verbal instructions inherent in the activity are useful in developing the ability to respond to directions also.

4) Tea Party - Used to promote social skills and develop self-help skills.

5) Art - "Clay" made from flour, salt and water was used as a creative manipulative material that lent itself easily to the learning of many words and concepts.

6) Surprise box - A child-sized box covered with aluminum foil and construction paper, and sometimes containing surprise objects, was used as an activity for learning such concepts as "in" and "out", "on top of" and "underneath;" the child could also hide objects, feel different textures in the box while blindfolded and use it as a drum.

7) Activities with paper tubes and rings - Different sized construction paper tubes and rings were used to promote general explorative and imitative behavior. The tubes could be looked through, talked through, stacked, put inside each other and used for the teaching of color and size concepts.

8) Blowing games - Introduced fundamental information about the sounds and effects produced by blowing, using such objects as a pitch pipe, punch ball, harmonica and party favors. Object names and concept labels were emphasized.

Not all activities took place in the vehicle. Some were planned especially to take advantage of the summer weather and because children universally enjoy them:

1) Sandbox activity - Molding sand in different shapes helped the child to distinguish between "wet" and "dry", "round" and "square", etc.
2) Walks - Encouraged gross motor activity and promoted exploratory behavior, particularly behavior related to the development of different senses.
3) Throw and catch and other simple games - Good for coordination, imitative behavior and learning to follow directions.
4) Water play - An activity that was used to teach labels and concepts such as "wet" and "dry," "in" and "out" (of child's wading pool), "float" and "sink," etc.

Operating the Mobile Unit. Teachers took turns operating the vehicle. Each weekday morning it was picked up at a gas station near the University where it was always parked overnight and serviced. So that each child (there were eight children between the ages of 12 and 18 months in the study at the time) could receive three hours of instruction from the vehicle every week, routes were carefully laid out to minimize the distances between stops. This meant that a greater number of stops were made on some days than on others as can be seen in Table 1.

As revealed in Table 1, a teacher spent one and one-half hours each day, two days per week, with most of the children, except for Friday when both teachers used two hours to make lesson plans for the

Table 1

Child No.	Teacher No.	Days Visited	Hours Spent instructing each visit		Total Hours per week
1	1	Mon., Wed.,	1½	1½	3
2	1	Mon., Wed.,	1½	1½	3
3	1	Mon., Wed.,	1½	1½	3
4	1	Mon., Wed.,	1½	1½	3
5	2	Tues., Thurs.,	1½	1½	3
6	2	Tues., Thurs.,	1½	1½	3
7	2	Tues., Thurs.,	1½	1½	3
8	2	Friday Only	3	N/A	3

following week. Both teachers worked approximately half-time because they were in school but the same services could have been provided by one full-time person.

When the teacher arrived at a child's home, the extension cord to the air conditioner was connected and instruction was ready to begin. Often mother and child would come to the vehicle together and the mother would observe the instruction for a while. When the demonstration project began, a "weaning away" procedure was used with each child as he was introduced to the program. It went this way. First, the teacher spent her instructional time in the child's home and in the presence of his mother. Often they shared in the instruction. After about two days, mother, child and teacher went to the vehicle together and remained inside together for the instructional period. Gradually, however, mother "faded" from the situation until the child and teacher spent the entire instructional period without mother. In only one case was a child not readily weaned in this manner. For this child, the weaning process took the entire two and one-half months and even then, while he would go with the teacher to the vehicle,he would not stay with her for more than a half-hour. In this instance, the teacher did most of her instruction in the home--an arrangement that was pleasant for all concerned fortunately.

Results and Discussion.

The purpose of using the mobile unit was not to prove that its use could significantly increase the communication abilities of the

children. Two and one-half months is far too short a period of time to produce such complex changes. Rather the purpose was to show that a mobile unit can be an effective way to carry early stimulation to the child irrespective of the curriculum content.

We shall look first at the results from the perspective of the program's impact on the family.

Fortunately, seven of the eight Down's infants adapted readily to this rather novel (for them) environment in terms of accepting a relative stranger for a tutor and responding positively to a new educational space and routine. This finding augers well for those willing to try this instructional technique with infants because it shows that, at least for these children, a short separation from mother was not generally a frightening experience. Even the one child who could not be weaned away readily was spending up to a half-hour in the camper without his mother by the end of the summer and could probably have been weaned away for the full one and one-half hour with a bit more time. Thus, for the child as young as one-year (its well to remember that the mental ages of these children averaged around nine months) a short separation from mother, if proper weaning is done, appears to be very feasible. In this regard, it seems to us that a maternal separation of 40 feet, the approximate distance from the front door of a home to the vehicle, may be a much more desirable instructional alternative than transporting infants miles from their mothers such as would happen if one were to assemble them for group instruction.

With respect to the effect of the program on the child's mothers, all reported that the program provided them with useful ideas that they

could use in stimulating their child's language development. Most reported also that they appreciated the three hour respite that the program afforded them each week. These outcomes, while not scientifically profound, are extremely important since any measure which provides relief from the psychological pressures which accompany the rearing of a Down's child is bound to have a salutary effect upon the overall outcome of an early intervention program in terms of child and family development.

With respect to the logistical feasibility of using a vehicle, there are several important factors. It is far easier to maintain the inside of a small vehicle in a suitably hygienic condition than to maintain an entire group setting in that condition. Furthermore, a vehicle requires little upkeep in comparison with that required for a building. In this regard, it takes perhaps 10 minutes to thoroughly clean the windows of a vehicle inside and out compared to the several hours it takes to do that task in a building. Then there is the distinct advantage of not having to contend with the logistical tangle of transporting infants to a group setting. With a mobile unit an infant doesn't have to be transported at all.

Economically, the cost of serving eight children can be broken down as follows:[4]

1. Rental cost, vehicle with camper body, two and one-half months . . . . . .$ 1,450.00
2. Cost of operating 2 1/2 months at an average of 250-300 miles/week.
   a. gasoline 920.00
   b. rental charge at $.07 per mile 200.62

[4]These costs could be reduced substantially by purchasing the vehicle.

3. Personnel costs, $2.10 per hour, 40 hours per week .	840.00
4. Other (oil change, etc)	16.00
TOTAL	$ 3,426.62

As can be seen, the cost of providing itinerant teaching services to eight children through a mobile unit program, three hours per child each week, over a nine-month school year is approximately $10,000--a cost that compares favorably with the usual cost of providing a public school teacher for homebound children.

Summary and Conclusions

A mobile unit was used over a two and one-half month period to demonstrate that an education program for Down's Syndrome infants can be conducted in a vehicle with good effects on the child and his family and with certain distinct economic and logistical advantages.

In concluding, we would caution that providing early stimulation through a mobile program is not an educational panacea. It would be unsatisfactory to use a mobile program exclusively when the children approach school age in the authors' opinion since it would deny them a chance for peer interaction. Additionally, it should be remembered that the mobile program was used to augment a mother's teaching not to supplant it. We believe that it is highly desirable to involve the child's mother in any way that will not place her at a disadvantage but that will allow her to interact with her child to their mutual advantage. The mobile unit program has the distinct advantage of maintaining a close contact with the child's mother without encroaching on her daily schedule.

Finally, it seems likely that a mobile program could be particularly advantageous in rural areas where group programs (if they exist at all) are a long distance from individual retarded infants. And, it seems reasonable to expect that this type of educational delivery service might have important implications for many kinds of handicapped infants, not just retarded infants.

APPENDIX

Project E.D.G.E.
(Expanding Developmental Growth Through Education)

Child's name_____

Date_____

Teacher_____

SAMPLE LESSON PLAN

Activity: Learning to blow into various instruments and on different materials.

General Objective: To teach that materials react to blowing.

Specific Objectives: 1) Teach the vocabulary words: "blow", "expand", "big", "little", "music", "noise", "bubble", "soap", plus the names and the colors of the objects. (All of these, in addition to other words, will be used in the course of the lesson, but particular emphasis will be placed on "blow" and on describing the particular results observed with each object). 2) Teach child that one action - blowing - can produce different effects.

Materials needed: party favors, harmonica, pitch pipe, windmill, straws, a jar of bubble soap, and a punch ball.

Brief description of activity planned: Introduce materials one at a time, blowing into each and manipulating each in interesting ways. For instance: play catch with the punch ball, stretch the punch ball, rub bubble soap between hands, make soap bubbles and float them in the air and spin the windmill with breath and fingers. Sit on the ground facing the child and roll the punch ball back and forth. Place a squeak-toy under a blanket and press it so that it squeaks -- see if child can find it under the blanket based on the location of the sound it makes.

Project E.D.G.E.
(Expanding Developmental Growth through Education)

Child's name_____

Date_____

Teacher_____

SAMPLE LESSON EVALUATION

Activity: Blowing

Child's reactions: "Scott was very enthusiastic during this lesson. He examined all of the materials and repeatedly tried to make the blowing response. After the bubble soap and straw was introduced and a bubble had been blown, he put the straw on his tongue and tried to blow a bubble. When he could get no result he would hold the straw out for me and was just delighted when I got the desired result."

Accomplishments: "Scott was unable to blow on and into the objects himself, but every effort was made on his part to do so. It was not a lack of interest or effort that caused him to fail, simply the inability to make the physical response of precision blowing. He was, however, exposed to the fact that blowing has various effects on different objects. He was able to discriminate the objects that made "music" from those that were soundless in a simple choice between two objects game."

Suggestions for building on the concepts in this lesson: "The physical act of blowing will be learned through repetition of activities similar to these. No reason why receptive development of the concept cannot precede his expressive development of the word (and act) as long as he remains interested and continues to try."

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